In re Patent Application of:
**AMMAR**
Serial No. **09/863,030**
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**In the Claims**:

1. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module comprising:

base plate;

a multi-layer, thick film substrate board formed from a plurality of planar sheets of low temperature co-fired ceramic material stacked and bonded together without intermediate conductive sheet layers so as to constitute ~~to form~~ a single, planar substrate ~~board~~ having ~~a planar~~ one planar bottom surface sheet with a planar bottom and one planar top sheet with a planar top surface, and received on said base plate and a plurality of MMIC chips ~~directly~~ attached to the top surface of the substrate board through a solder, conductive adhesive, or shims and operable to transmit and receive millimeter wavelength signals, said substrate board comprising:

a lower DC signals layer formed from a separate sheet and having signal tracks and connections;

a ground layer formed from a separate sheet and having ground connections and positioned over said DC signals layer;

a device layer formed from a separate sheet and having capacitors and resistors embedded therein that connect to MMIC chips and positioned over said ground layer;

a planar sheet of low temperature co-fired ceramic material positioned ~~at the~~ at said one planar top surface ~~of the substrate board~~ and having cutouts for receiving the MMIC chips therein; ~~and~~

a channelization plate received over the top surface of the substrate board and having channels formed to receive the MMIC chips and provide air isolation between transmit and receive signals; and

isolation and/or interconnect and/or ground vias which extend through the device layer to the ground layer.

2. (CANCELLED)

3. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 1, and further comprising a radio frequency cover received over said channelization plate.

4. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 1, wherein each of said layers within said multi-layer substrate board is about 2 to about 4 mil thick.

5. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 4, wherein said layers are about 3 mil thick.

6. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 5, wherein said top layer is about 4 mil thick.

7. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 1, wherein said base plate is formed from a CTE matched material.

8. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 1, wherein said base plate is about 0.1 to about 0.3 inches thick.

9. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module according to Claim 8, wherein said base plate is ~~about~~ substantially 0.125 inches thick.

10. (CURRENTLY AMENDED) A multi-layer thick film substrate board used in millimeter wave transceiver modules comprising:

a plurality of planar sheets of low temperature transfer tape stacked and bonded together ~~to form~~ without intermediate conductive sheet layers so as to constitute a single, planar substrate board having ~~a planar~~ one planar bottom surface and one planar top surface on which a plurality of MMIC chips are mounted using solder, conductive adhesive or shims and operable to transmit and receive millimeter wavelength signals, and comprising:

a lower DC signals layer formed from a separate sheet and having embedded DC signal tracks and connections;

a ground layer formed from a separate sheet having ground connections and positioned over the DC signals layer; ~~and~~

a device layer formed from a separate sheet having capacitors and resistors embedded therein that connect to MMIC chips and positioned over the ground layer; and

isolation and/or interconnect and/or ground vias which extend through the device layer to the ground layer.

11. (CANCELLED)

12. (CURRENTLY AMENDED) A substrate board according to Claim 10, wherein each of said ~~layers~~ planar sheets within said multi-layer substrate board is about 1 to about 4 mil thick.

13. (CURRENTLY AMENDED) A substrate board according to Claim 12, wherein said ~~layers~~ planar sheets are about 3 mil thick.

14. (CURRENTLY AMENDED) A substrate board according to Claim 10, wherein said top ~~layer~~ planar sheet is about 4 mil thick.

15. (ORIGINAL) A substrate board according to Claim 10, wherein said base plate is formed from a CTE matched material.

16. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module comprising:

base plate;

a multi-layer, thick film substrate board received on said base plate and formed from a plurality of planar sheets of low temperature co-fired ceramic material stacked and bonded together without intermediate conductive sheet layers so as to constitute a single planar substrate board

having one planar bottom sheet with one planar bottom surface and one planar bottom sheet with one planar top surface, ~~to form a single planar substrate board having a planar bottom surface and planar top surface, said layers~~ said planar sheets comprising

a lower DC signals layer formed from a separate sheet and having embedded DC signal tracks and connections;

a ground layer formed from a separate sheet having ground connections and positioned over the DC signal layer;

a device layer formed from a separate sheet having capacitors and resistors embedded therein and positioned over the ground layer;

a sheet having cut-outs secured at the top surface for receiving MMIC chips;

isolation and/or interconnect and/or ground vias which extend through the device layer to the ground layer;

a plurality of MMIC chips surface mounted on ~~the top~~ said planar top surface and operatively connected to said DC signal tracks and connections, to said ~~signals~~ ground and to said capacitors and ~~resistors~~ resistors, and operable to transmit and receive millimeter wavelength signals; and

a channelization plate received over the formed multi-layer substrate board and having channels formed to receive MMIC chips and provide air isolation between transmit and receive signals.

17. (CANCELLED)

18. (PREVIOUSLY AMENDED) A thick film millimeter wave transceiver module according to Claim 16, and further comprising a solder preform layer for securing the plurality of MMIC chips to said substrate board.

19. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module according to Claim 16, and further comprising ~~a silver~~ silver epoxy securing the plurality of MMIC chips to the substrate board.

20. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 16, and further comprising a radio frequency cover received over said channelization plate.

21. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module according to Claim 16, wherein each of said ~~layers~~ planar sheets within said multi-layer substrate board is about 2 to about 4 mil thick.

22. (CURRENTLY AMENDED) A thick film millimeter wave transceiver module according to Claim 21, wherein said ~~layers~~ planar sheets are about 3 mil thick.

23. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 16, wherein said base plate is formed from a CTE matched material.

24. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 23, wherein said base plate is about 0.1 to about 0.3 inches thick.

25. (ORIGINAL) A thick film millimeter wave transceiver module according to Claim 24, wherein said base plate is about 0.125 inches thick.

26. (CURRENTLY AMENDED) A method of forming a thick film millimeter wave transceiver module comprising the steps of:

forming a base plate;

forming a thick film, multi-layer substrate board by stacking and bonding together without intermediate, conductive sheet layers a plurality of planar sheets of low temperature co-fired ceramic material to form a single planar substrate board having a planar bottom surface and ~~planar~~ top surface on which MMIC chips are mounted and operable to transmit and receive millimeter wavelength RF signals;

receiving the thick film, multi-layer substrate board on the base plate, wherein the substrate board comprises

a lower DC signals layer formed from a separate sheet and having signal tracks and connections;

a ground layer formed from a separate sheet having ground connections and positioned over the DC signals layer;

a device layer formed from a separate sheet having capacitors and resistors embedded therein and positioned over the ground layer; and

securing the MMIC chips onto the top surface of the thick film multi-layer substrate board such that the MMIC chip operatively connects to capacitors and resistors embedded within the device layer and other layers via interconnects within the thick film substrate board that extend through the device layer to the ground layer.